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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/675,298	09/30/2003	Juergen K. Weinhofer	081696-0251 (02AB200)	5380

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EXAMINER	
KOSOWSKI, ALEXANDER J	
ART UNIT	**PAPER NUMBER**
2125	

DATE MAILED: 09/09/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/675,298	WEINHOFER, JUERGEN K.	
	Examiner	Art Unit	
	Alexander J. Kosowski	2125	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,15-21,23 and 24* is/are rejected.

7)☒ Claim(s) *14 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *2/5/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1) Claims 1-24 are presented for examination.

Allowable Subject Matter

2) Claims 14 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3) Claim 17 recites the limitation "the transition path segment" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4) The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5) Claims 1, 3-12, 15-17, 19-20 and 23-24 are rejected under 35 U.S.C. 102(e) as being unpatentable by Yutkowitz (U.S. pat 6,782,306).

Referring to claim 1, Yutkowitz teaches a system comprising control logic and a programming interface, the programming interface being configured to permit a user to specify a

plurality of weighting points in a multi-dimensional coordinate space (col. 5 lines 47-65), and the control logic including spline computation logic configured to generate a spline curve based on boundary conditions (col. 5 line 62 through col. 6 line 8), wherein the spline curve extends near the weighting points (Figure 3), and wherein the control logic is configured to generate control signals to control operation of a plurality of motion axes to drive movement of a controlled element along a path defined by the spline curve (col. 6 line 15 through col. 7 line 5).

Referring to claim 3, Yutkowitz teaches that the spline curve may not pass through a weighting point (Figure 4).

Referring to claim 4, Yutkowitz teaches that the spline curve comprises a plurality of spline curve segments (Figure 3); wherein the control logic determines a starting velocity vector, a starting acceleration vector, an ending velocity vector, and an ending acceleration vector for each of the spline curve segments (col. 26 lines 10-22); wherein the ending velocity vector and the ending acceleration vector for each of the plurality of spline curve segments are determined so as to be approximately equal to the starting velocity vector and the starting acceleration vector for a next adjacent one of the plurality of spline curve segments (col. 29 line 66 through col. 30 line 20).

Referring to claim 5, Yutkowitz teaches that the control signals include position reference values, and wherein the control logic includes an interpolator configured to generate the position reference values substantially simultaneously along a plurality of different motion axes (col. 7 line 40 through col. 8 line 7).

Referring to claim 6, Yutkowitz teaches that the interpolator generates the position reference values based on a plurality of coefficient vectors, the coefficient vectors being

coefficients of the spline curve and being determined based on the boundary conditions and the weighting points (col. 7 line 40 through col. 8 line 7 and col. 18 lines 48-62).

Referring to claim 7, Yutkowitz teaches that the path defined by the spline curve connects first and second additional path segments, the first and second additional path segments being non-tangential (col. 13 lines 56-67 and Figures 5-6).

Referring to claim 8, Yutkowitz teaches that the first and second additional path segments are linear path segments (col. 13 lines 56-67).

Referring to claim 9, Yutkowitz teaches that one of the first and second additional path segments is a linear path segment and the other one of the first and second additional path segments is a curved path segment (col. 13 lines 56-67).

Referring to claim 10, Yutkowitz teaches that the first and second additional path segments are curved path segments (col. 13 lines 56-67 and Figures 5-6).

Referring to claim 11, Yutkowitz teaches that the merging point is derived from the first and second path segment (Figures 5-6).

Referring to claim 12, Yutkowitz teaches that the spline curve is generated without using characteristics of the first and second path segments other than velocity and acceleration vectors for the first and second path segments at the boundary points (col. 26 lines 10-22).

Referring to claim 15, Yutkowitz teaches that the system is an industrial control system (col. 1 lines 27-31).

Referring to claim 16, Yutkowitz teaches a control method for controlling movement of a controlled element in a multi-dimensional coordinate system, comprising: receiving a plurality of weighting points by way of a user instruction (col. 5 lines 47-65); generating a plurality of

control points for a plurality of adjacent spline segments based on boundary conditions and the plurality of weighting points (col. 5 line 62 through col. 6 line 8); generating a plurality of coefficient vectors for the plurality of spline segments based on the plurality of control points (col. 7 line 40 through col. 8 line 7 and col. 18 lines 48-62); generating a first plurality of position reference values based on the plurality of coefficient vectors and using the first plurality of position reference values to control a first motion axis, the first motion axis operating in a first dimension of the multi-dimensional coordinate system and generating a second plurality of position reference values based on the plurality of coefficient vectors and using the second plurality of position reference values to control a second motion axis, the second motion axis operating in a second dimension of the multi-dimensional coordinate system (col. 5 line 62 through col. 7 line 5 and col. 11 lines 1-7, whereby motion may be controlled over multiple programmable axes).

Referring to claim 17, Yutkowitz teaches that, during movement along the transition path segment, the controlled element transitions from a previous path segment, to the spline path, and then to a next path segment without discontinuities in velocity and acceleration (col. 29 line 16 through col. 30 line 20).

Referring to claim 19, Yutkowitz teaches that the spline curve may not pass through a weighting point (Figure 4).

Referring to claim 20, see rejection of claim 4 above.

Referring to claim 23, Yutkowitz teaches a system comprising motion control logic configured to control a first motion axis and the second motion axis in accordance with a user program (col. 5 lines 47-65 and col. 11 lines 1-7), wherein the motion control logic provides a

plurality of instructions configured for use in the user program, the plurality of instructions including an instruction that permits a move to be specified by specifying weighting points for a spline path to be followed by the controlled element in a multi-dimensional coordinate system that includes the first motion axis and the second motion axis (col. 5 line 62 through col. 7 line 5).

Referring to claim 24, Yutkowitz teaches an industrial control system comprising: a plurality of input and output devices (col. 5 lines 47-61 and Figure 1); a communication network (col. 4 lines 9-11 and Figure 1); a plurality of motion axes (col. 11 lines 1-7); a plurality of microprocessor-based controllers, the plurality of controllers being coupled to each other by way of the communication network and being coupled to respective ones of the plurality of input devices and the plurality of output devices and being configured to control the plurality of output devices based on input status information from the plurality of input devices (col. 5 line 47 through col. 6 line 60 and Figure 1), the plurality of microprocessor-based controllers including control logic configured to control the plurality of motion axes (col. 6 line 39 through col. 7 line 5), and the plurality of controllers being configured to be programmed with a user program (col. 5 lines 47-61); and a programming interface, the programming interface being configured to permit a user to generate the user program, the user program including a user instruction which permits the user to specify a plurality of weighting points in a multi-dimensional coordinate space (col. 5 lines 47-61); and wherein the control logic includes spline computation logic configured to generate a spline curve which extends near the weighting points, and is configured to generate control signals to control operation of the plurality of motion axes to drive movement

of a controlled element along a path defined by the spline curve (col. 5 line 62 through col. 7 line 5).

Claim Rejections - 35 USC § 103

6) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7) Claims 2 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yutkowitz, further in view of Sato et al (U.S. Pat 5,955,856).

Referring to claim 2, Yutkowitz teaches the above. However, Yutkowitz does not explicitly teach that the spline curve is a Bezier spline curve.

Sato teaches a method of programming weighting points and creating spline curves whereby Bezier spline curves may be utilized (col. 7 lines 18-22).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize Bezier curves in the invention taught above since Bezier curves make it possible to obtain the same effect as spline curves when creating a path of continuous travel through weighting points (Sato, col. 6 line 65 through col. 7 line 22).

Referring to claim 18, see rejection of claim 2 above.

8) Claims 13 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yutkowitz, further in view of Letcher, Jr. (U.S. pat 5,581,672).

Referring to claim 13, Yutkowitz teaches the above. However, Yutkowitz does not explicitly teach that the programming interface is an object-oriented programming interface in which displayable objects are used to represent physical hardware and relationships between physical hardware.

Letcher teaches a design system that utilizes object-oriented programming to create multi-dimensional structures comprising points and boundaries (col. 8 lines 12-35).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an object-oriented interface in the system above since this would allow for a user to freely rotate, zoom or pan to select appropriate views of the object being programmed (Letcher, col. 8 lines 12-26).

Referring to claim 21, see rejection of claim 13 above.

Conclusion

9) The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Boyer (U.S. Pat 5,923,132) – teaches an apparatus for planning multi-axis paths.

10) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 571-272-3744. The examiner can normally be reached on Monday through Friday, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. In addition, the examiner's RightFAX number is 571-273-3744.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Alexander J. Kosowski
Patent Examiner
Art Unit 2125

LEO PICARD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100